REMARKS

In response to the rejection under 35 U.S.C. § 112, second paragraph, claim 6 has been amended, for clarification, to recite that the inorganic material excluding metal has an average particle size of 2 μm or less. Support is found, for example, bridging pages 40-41 of the substitute specification, where the bright part of the reflection electron composition image shows heavy elements such as Cu and the dark part shows the inorganic material (such as SiO_2 or TiO_2). This is a description of inorganic material excluding metal.

Moreover, claim 6 has been amended to more clearly recite that the inorganic material is uniformly dispersed within the conductor layer. Consequently, the inorganic material does not migrate to the conductor layer surface. This is discussed at page 17, lines 3-9 of the specification.

It is respectfully submitted that claim 6 as amended herein fully complies with 35 U.S.C. § 112, and withdrawal of the foregoing rejection is respectfully requested.

Claims 1, 3, 4, 6 and 7 were rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,296,189 to Kang et al. Kang et al. was cited as disclosing a conductive paste meeting the terms of the rejected claims which is screen-printed onto a ceramic substrate to form a printed circuit board. Specifically, the Examiner cited Kang et al. as disclosing a conductive composition containing copper particles having an initial particle size of 2 to 5 μm and alumina particles of 0.05 to 0.1 μm (citing column 4, lines 37-40).

In response, claim 1 has been amended to call for a copper paste comprising a copper powder, an organic vehicle, an SiO_2 particle and a ceramic particle selected from the group

consisting of Al_2O_3, TiO_2, CeO_2 and mullite (i.e., a combination not disclosed by Kang et al.). Thus, claims 1, 3, 4, 6 and 7 are not anticipated by Kang et al. Support for the Markush group which defines the non-vitrifiable ceramic particle is found bridging pages 3-4 of the substitute specification.

Moreover, Kang et al. which relates to preventing crack formation in the conductor of a Cu via does not disclose or lead one of ordinary skill to the specific combination of amended claim 1 which seeks to prevent waving and to prevent glass from migrating to the conductor surface. Claim 7 (a surface of the conductor layer is subjected to a plating treatment) is separately patentable from claim 1 from which it depends because the cited passage at column 6, lines 51-56 of Kang et al. only relates to a via conductor.

Claim 3 has been canceled.

It is respectfully submitted that the claims as amended are patentable over Kang et al., and withdrawal of the foregoing rejection under 35 U.S.C. § 102(b) is respectfully requested.

Claims 8-10 were rejected under 35 U.S.C. § 102(b) as being anticipated by GB 2 033 667 A to Powers, Jr. (GB '667). GB '667 was cited as teaching a circuit board comprised of a conductive material 14 comprised of copper or other metals and alloys, the conductive material being applied to the base 10 in a molten state so as to contain no particle form. The Examiner further cited GB '667 as disclosing plating a surface of the conductive material 14 with solder.

Applicants respond as follows.

Claims 8 and 9, as amended to recite that the conductor layer contains an inorganic material excluding metal dispersed within the conductor layer, patentably distinguish over

GB '667 relied upon by the Examiner as disclosing molten copper having no particle form. Because the claimed "inorganic material" excludes metal, and because the conductive material of GB '667 does not contain such inorganic material, GB '667 also does not meet the limitations relating the total area of the inorganic material having a particle size of 2 μm or more or 3 μm or more in an amount of 5 % or less or 2 % or less of the sectional area of the conductor layer. Namely, because the claimed "inorganic material" excludes metal, the molten copper of GB '667 does not meet the amended claims. Withdrawal of the foregoing rejection under 35 U.S.C. § 102(b) is respectfully requested.

Claim 2 was rejected under 35 U.S.C. § 102(b) as anticipated by or, under 35 U.S.C. § 103(a) as obvious over Kang et al. Kang et al. was cited as teaching a copper paste comprising copper powder, an organic vehicle and a ceramic particle, namely, alumina having an average grain size of 0.5 μm (50 nm). Kang et al. was further cited as teaching that other inorganic materials such as SiO_2 can be used in place of alumina (citing column 4, lines 33-35). The reason for rejection was that it would have been obvious to substitute the alumina of the copper paste of Kang et al. with silica while choosing the same particle size to provide a more homogenous copper conductor and to reduce interparticle porosites (column 6, lines 1-12).

In response, claim 2 has been amended to recite a SiO_2 particle content of 0.1 to 5 parts by mass, in addition to an average particle size of 50 nm or less. Support is found, for example, at page 8, lines 4-6 of the specification.

Kang et al. has no description as to the particle size and amount of SiO_2. The effects of the invention of claim 2 are to reduce waving and to improve wetting property for plating or

soldering. There is nothing in Kang et al. which would lead one of ordinary skill to specify the amount and particle size of SiO_2, especially considering that the objective of Kang et al. as it relates to preventing crack formation in the conductor of a Cu via is entirely different from that of the invention.

For the above reasons, it is respectfully submitted that amended claim 2 is neither anticipated nor obvious over Kang et al., and withdrawal of the foregoing rejection is respectfully requested.

Claim 5 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Kang et al. Kang et al. was cited as disclosing a ceramic substrate formed of crystallizable glass particles densified to form a green sheet, which crystallizable glass particles can include lithium disilicate. The Examiner considered that choosing a workable amount (of an alkali metal oxide) would involve only routine experimentation.

Applicants rely on the response above with respect to the rejection of claim 1 over Kang et al. Claim 5 depends on claim 1, and therefore includes all of the limitations of claim 1. Claim 5 is patentable for at least the same reasons that claim 1 is patentable over the cited prior art.

Withdrawal of the foregoing rejection is respectfully requested.

Additionally, method claim 15 has been amended to include all of the limitations of amended claim 1. Applicants respectfully request rejoinder upon allowance of the product claims.

Withdrawal of all rejections and allowance of claims 1, 2, 4-10 and 15 is earnestly solicited.

In the event that the Examiner believes that it may be helpful to advance the prosecution of this application, the Examiner is invited to contact the undersigned at the local Washington, D.C. telephone number indicated below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

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